B. Industry Documents

1. INPO - "Evaluation of Browns Ferry Nuclear Plant" - 1982 Evaluation Report

C. NRC Correspondence

1. Letter from Darrell G. Eisenhut to All BWR Licensees dated July 7, 1981, "Safety Concerns Associated with Pipe Breaks in the BWR Scram System (Generic Letter No. 81-26)" (A27 810720 021)

2. Letter from Darrell G. Eisenhut to All BWR Licensees (Except Humbolt Bay) dated August 31, 1981, "Safety Concerns Associated with Pipe Breaks in the BWR Scram System (Generic Letter 81-34)" (A27 810921 020)

D. TVA Documents

1. Corporate

a. "Quality Assurance Guidelines for TVA Laboratories," draft dated August 24, 1982, prepared by the Laboratory Services Coordinating Committee

b. TVA Code X Nuclear Safety, dated April 6, 1983, "Safety of Nuclear Facilities Activities"

c. TVA Code VIII dated October 16, 1980, "Occupational Radiation Protection"

2. NSRS

a. Memorandum from H. N. Culver to H. G. Parris dated February 25, 1983, "Special Program Management Review of the Office of Power Water Quality Program - Nuclear Safety Review Staff Report No. R-82-08-NPS" (GNS 830225 050)

b. Memorandum from H. N. Culver to H. G. Parris dated January 10, 1984, "Browns Ferry Nuclear Plant - Technical Specifications Surveillance Requirements and Limiting Conditions for Operation for Dose Equivalent I-131 - NSRS Report No. R-82-08-NPS, Item R-82-08-NPS-10b" (GNS 840110 050)

3. OQA

a. Memorandum from J. W. Anderson to Those listed dated June 30, 1983, "Review of Draft 3 of Proposed Revision 7 to TVA Topical Report TVA-TR-75-1A" (OQA 830630 001)

b. Memorandum from R. L. Lumpkin to Those listed dated June 13, 1983, "Revised Office of Power Quality Assurance Manual (POWER-QAM)" (OQA 830613 706)

c. Memorandum from R. L. Lumpkin to J. G. Holmes dated July 25, 1983, "Revised Office of Power Quality Assurance Manual (POWER-QAM)" (OQA 830725 704)

d. Memorandum from John R. Lyons to Those listed dated October 20, 1983, "Review of Proposed Revision to the Office of Power Quality Assurance Manual (OP-QAM) Draft 1" (OQA 831020 404)

e. Quality Assurance and Audit Staff Audit Report for Audit No. OPQAA-CH-8200-04, "Control of Measuring and Test Equipment," dated March 8-19, 1982 (A24 820419 002)

f. Joint Quality Assurance Audit Report for Audit No. JA-8200-01, "Calibration," audit dates March 25-16, 1982 (QAM 820503 001)

g. Memorandum from R. L. Lumpkin to B. D. Draper dated August 12, 1983, "Operations Quality Assurance Audit Report CH-8300-03" (OQA 830812 701)

h. Quality Assurance and Audit Staff Audit Report for Audit CH-8300-03, "QA Program Implementation," audit dates June 27 - July 13, 1983

i. Memorandum from A. W. Crevasse to B. D. Draper dated July 19, 1982, "Maintenance Coordination Staff Quality Program Procedure No. 10" (A27 820719 007)

j. Memorandum from R. L. Lumpkin to H. J. Green dated October 21, 1983, "Quality Program Audit Report No. CH-8200-12" (L29 831018 929)

k. Memorandum from R. L. Lumpkin to H. J. Green dated September 14, 1983, "Quality Program Audit Report CH-8200-12" (S24 821223 002)

l. Quality Program Audit Report, Audit No. OPQAA-CH-81TS-04, audit dates September 14-28, 1981, "Nonradiological Environmental Monitoring, Radiological Environmental Monitoring, Radiological Process Monitoring - Regulatory Guide 4.15" (A24 811020 003)

m. Quaity Program Audit Report, Audit No. OPQAA-SQ-80TS-03, audit dates January 21-23, 1981, "Radiological Environmental Monitoring, Radiological Process Monitoring (RG 4.15)" (A24 810223 001)

n. Quality Program Audit Report, Audit No. OPQAA-BF-80TS-03, Audit dates November 18-21, 1980, Radiological Environmental Monitoring, Radiological Process Monitoring" (A24 801212 002)

o. OP-QAP-1.1, R2, "Organization," August 30, 1983

p. OP-QAP-1.4, R0, "Maintenance Coordination Staff Quality Program," August 30, 1983

4. Office of Power

a. Office Manager

1. Letter from H. G. Parris to E. P. Wilkerson, President, Institute of Nuclear Power Operations, "INPO's Corporate Assistance Visit," dated October 27, 1983 (L16 831021 890)

b. Maintenance Coordination Staff

1. Memorandum from John G. Holmes to L. M. Mills dated May 26, 1983, "Review of Revision 7, TVA-TR75-1" (A27 830513 001)

2. Memorandum from John G. Holmes to R. L. Lumpkin dated June 27, 1983, "Revised Office of Power Quality Assurance Manual (POWER-OQAM)" (A05 830624 001)

3. Memorandum from John G. Holmes to John R. Lyons dated November 4, 1983, "Review of Proposed Revisions to the Office of Power Quality Assurance Manual (OP-OQAM) Draft 1" (E13 831101 001)

4. MCS Quality Program Procedure No. CLS-QAP-2.1, "Preparation, Review, and Approval of Procedures, Instructions, and Drawings" Draft

5. MCS Quality Program Procedure No. CLS-QAP-2.2, "Administrative Control of Quality Documents" Draft

6. MCS Quality Program Procedure No. CLS-QAP 11.1, "Quality Assurance Orientation and Technical Training," Draft

7. MCS Quality Program Procedure No. CLS-QAP-12.1, "Quality Trend Analysis," RO, September 30, 1983

8. Central Laboratory Training Record Booklet (Draft)

9. Memorandum from B. D. Draper to A. Q. Crevasse dated July 9, 1982, "Maintenance Coordination Staff Quality Program" (A05 820709 200)

10. Memorandum from B. D. Draper to H. A. Taff and R. S. Zottle dated May 5, 1982, "Maintenance Coordination Staff - Quality Program" (A05 820505 203)

11. MCS Quality Program Procedure No. 1.0, "Performance and Quality Management," RO, July 15, 1982

c. Radiological Hygiene Staff

1. Memorandum from R. B. Maxwell to J. W. Hartley dated October 17, 1983, "Contamination Survey at Service Building, Power Services Center" (A58 831017 104)

d. Nuclear Licensing Staff

1. Memorandum from L. M. Mills to Those listed dated May 13, 1983, "Review of Revision 7, TVA-TR75-1" (A27 730513 001

2. Memorandum from L. M. Mills to John G. Holmes dated June 8, 1983, "Resolution of Comments on Proposed Revision 7, TVA-TR75-1"

3. Letter from L. M. Mills to Harold R. Denton dated October 27, 1983, "In the Matter of Tennessee Valley Authority Docket Nos. 50-259, 50-260, and 50-296" (Enclosure 1, Proposed Technical Specification Revisions Browns Ferry Nuclear Plant Units 1, 2, and 3)

Memorandum

TENNESSEE VALLEY AUTHORITY

TO : G. H. Kimmons, Manager of Engineering Design and Construction, W12A9 C-K

FROM : N. N. Culver, Director of Nuclear Safety Review Staff, 249A HBB-K

DATE : February 3, 1984

SUBJECT: REVIEW OF THE DIVISION OF CONSTRUCTION QUALITY ASSURANCE/QUALITY CONTROL PROGRAM - NSRS REPORT NO. R-83-27-NPS

During October and November 1983, NSRS performed a review of the CONST Quality Assurance/Quality Control (QA/QC) Program. The review focused on implementation of the program by the BLN and WBN Quality Manager's Organizations (QMO) created in January 1983. Four specific areas were reviewed, including (1) site specific QC organization and program, (2) training and qualification of personnel, (3) corrective action programs, and (4) inspection process. Also, where differences between site's activities were observed, these were evaluated.

The attached report concludes that the CONST QA/QC program implemented by the QMO and the Quality Engineering and Support Staff (QESS) is adequate, but with some weaknesses, and improving. The objective in establishing the QMO of assuring that QC inspectors are sufficiently independent to report quality problems appears to have been achieved. Other desired objectives, such as achieving consistency of program application at and between sites and establishing a verified QA/QC philosophy, have yet to be fully realized. One recommendation concerning improvement in the communication of information and requirements necessary to achieve consistency and enhance efficiency has been made for your consideration of appropriate corrective action. It was determined that problems with effective communication of requirements may have contributed to inefficiency of production as indicated by apparent high reject/failure rates and to an opinion held by some QC supervisors and inspectors that QC was the only group held accountable for knowledge of requirements.

The corrective action response should be submitted for evaluation by April 1, 1984. If you have any questions concerning this memorandum, please contact M. A. Harrison at extension 4816.

H N Culver
H. N. Culver

MAH:LML
Attachment
cc (Attachment):
J. W. Anderson, MISSG MIB-K
C. F. Dilworth, E12D46 C-K
H. G. Parris, W5B63 C-K
MEDS, W5B63 C-K

TENNESSEE VALLEY AUTHORITY

NUCLEAR SAFETY REVIEW STAFF

REVIEW

NSRS REPORT NO. R-83-27-NPS

SUBJECT: **Review of the Division of Construction QA/QC Program**

DATE OF REVIEW: October 31 - November 22, 1983

COORDINATOR: M. A. HARRISON DATE

REVIEWERS: C. M. [illegible] - BELLEFONTE TEAM LEADER DATE

D. E. JONES - WATTS BAR TEAM LEADER DATE

D. L. BAILEY DATE

APPROVED BY: R. D. SMITH DATE

TABLE OF CONTENTS

I. BACKGROUND

In response to concerns, both internal and external to TVA regarding the independence and effectiveness of the TVA nuclear construction quality control of inspection functions and in an effort to reduce the span of control of construction engineering, a reorganization to separate the quality control (QC) functions from production support units was accomplished at the Watts Bar Nuclear Plant (WBN) and the Bellefonte Nuclear Plant (BLN). The reorganization removed the QC inspection and related quality assurance (QA) functions (i.e., document control and records, training, procedures, licensing, and response functions) from the construction engineering organization and placed them under a new Quality Manager's Organization (QMO) at each plant. The QMO is under the supervision of the Quality Manager, who reports directly to the Project Manager (PM). The QMO became effective January 23, 1983, and was implemented February 20, 1983. The organizations were similarly staffed and contained management positions at an acceptable level to ensure the integrity of the QA/QC efforts at these plants.

The Director of NSRS in memoranda to the General Manager dated July 19, 1983, and August 9, 1983, committed NSRS to perform a review of quality control activities in the fall of 1983 to assess the practical application of the new QMO's at WBN and BLN. This commitment was made based on concerns about the overall QA/QC program and management controls as expressed by TVA Board comments, the NSRS memoranda noted above, and by NRC inspection report transmittal letters on WBN in June 1983. As a result of these concerns and commitments, a four man review team was assigned. The review commenced on October 31, 1983, and was concluded on November 22, 1983 with an exit with the Manager of Construction.

II. SCOPE

The primary focus of the review was to determine if the creation of the Division of Construction (CONST) QMO with its separation of the quality control function from the production support function had in fact resulted in both improved quality and quality management performance. The review elements involved were: (1) CONST quality organization and programs, (2) Quality Manager's organization and programs, (3) training, qualifications, and certification of personnel, (4) engineering and craft training, (5) corrective action programs, and (6) inspection implementation. This review did not address the deferred plants or construction service activities at operational plants.

III. MANAGEMENT SUMMARY

The NSRS review of the CONST QA/QC program concentrated on the QMO, QC procedures, and performance of activities at Watts Bar and Bellefonte, and the division-level program requirements. Of the areas reviewed, no new violations of regulatory requirements were

identified. Overall the program and organization were determined to be adequate with some weaknesses, and improving.

The primary purposes for which the QMOs were created, i.e., increasing the organizational independence and status of QC inspectors, reducing the Construction Engineer's span and depth of control to a manageable level, and creating an awareness of QC responsibilities, have been accomplished. Construction engineering and quality personnel were nearly unanimous in their acceptance and appreciation of the reorganization. Other goals expressed by the OEDC Project Managers intended by the reorganization had not been fully achieved, as some program and performance weaknesses were identified. The other stated goals are summarized below:

1. Achieve consistency of implementation

2. Achieve unified QA/QC philosophy

3. Improve training programs

It was noted during the review that some programs required by the CONST QA Program Manual and the CONST QA Training Certification Manual permit wide variation between sites in implementing strategies as described by site-generated QC procedures. As examples: At Watts Bar only, journeyman craftsmen receive scheduled instruction in QC procedures; only Bellefonte performs testing of craft and engineering personnel to determine the effectiveness of their formal QC training; the philosophies of use of the Inspection Rejection Notice, a deficiency-reporting document used at Watts Bar and recently implemented at Bellefonte, differ significantly as do the local practices of determining and reporting a variety of trends.

Variations such as these were considered the result of insufficient upper-tier program guidance necessary for consistency, rather than the result of deliberate management prerogative.

Directly related to the problem of insufficient guidance for implementing TVA requirements was the concern expressed by almost all hanger QC inspectors and their supervision, with interpretation of the drawing notes for typical hangers. Generally the notes were disorganized, referenced each other and unincluded documents, and were subject to extremes in interpretation. For example, at Watts Bar the notes for typical hanger drawing 47A050, number 32 pages with 27 referenced Field Change Requests. The EN DES hanger design and hanger design change processes were not reviewed during this review; however, it did not appear that additional training of QC inspectors on the content of these notes would correct the root cause of this situation.

The problems with program definition and communication described above do not overshadow a significant effort by CONST to improve the quality program. On the division level, the Quality Engineering and Support Staff (QESS) had revised and/or initiated Quality

Assurance Policies (QAPPs) and Quality Assurance Procedures (QAPs) to account for the creation of the QMO and reassignment of responsibilities from QA to the QMO. Quality managers at both sites had initiated and/or issued new or revised procedures implementing the changes in a timely manner. Efforts to resolve INPO and NRC findings were noted to have been initiated at Bellefonte. Additionally, the following summarized points, considered to be strengths, were observed:

1. Improved attitude of QC inspectors as a result of having their "own" managerial organization and clearly-defined roles. No inspector interviewed had any concerns of harassment or interference. QC inspectors observed on the job appeared generally knowledgeable, industrious, and committed to quality performance.

2. Job descriptions and MAS evaluations for Quality Management Personnel indicated a strong emphasis on achievement of quality objectives.

3. CONST Quality Management was aware of upper-tier program weaknesses. Most appeared to be under active consideration of correction although there was concern that OQA's Management Policies and Requirements (MPMs), when issued, would require another series of revisions to divison and site procedures.

4. Specifically the current welding inspection qualification program in operation at Watts Bar and the Mechanical QC Unit's training program at Bellefonte were determined to be well organized, efficient, and exacting.

5. The cancellation/deferral of other nuclear projects has permitted an experienced QC group to be concentrated at Watts Bar and Bellefonte.

IV. CONCLUSIONS AND RECOMMENDATIONS

As a result of evaluation of the problems and weaknesses of the CONST QA/QC program described in Section VI "Details," it was determined that they all related to weaknesses in communication of requirements and information.

R-83-27-NPS-01 Weaknesses in Communication of Requirements and Information

Conclusion: Although the QA/QC program and QMO were determined to be adequate and improving, weaknesses in communication of requirements and information have delayed achievement of consistently applied programs at each site as well as between sites. Specifically:

1. The QATM did not provide guidance for evaluating the effectiveness of formal training, minimum requirements for determining an employee's readiness and ability to independently perform work (excluding NDE). Site procedures were not definitive in these areas. Additional details are described in section VI.B.2.

2. Division-level requirements for performance of trend analysis and the Inspection/Rejection Notice system were insufficient. Variations in basic philosophy, application, and reporting were observed between sites and among units at sites.

3. Trend analysis or other means of communication had not disclosed a generic problem with inadequate definition of requirements for inspection of typical hangers. Project management at both sites stated they were not fully aware of the magnitude of the problem. Conversely, trend analysis of IRNs at Watts Bar had disclosed a problem with crafts turning in incomplete work for QC inspection, but effective corrective action had not been taken.

Recommendation: Construction management should continue efforts to improve the division-level and site quality programs to achieve the expressed goal of consistency of implementation and uniformity of QA philosophy. Specific program differences and communication weaknesses identified in section VI should be evaluated and modifications made as determined appropriate.

NSRS also concluded that the present QA/QC program and Quality Manager's Organization demonstrated noteworthy strengths in some areas. These are described in the Management Summary and in Section VI, "Details," and are not reiterated here.

V. STATUS OF PREVIOUSLY IDENTIFIED OPEN ITEMS

Two items remaining open from NSRS report R-81-28-WBN were reviewed to verify that corrective action taken had been effective.

A. R-81-28-WBN-14, Inadequate Procedure Review

Responsiblity for conducting site procedure reviews was transferred from the QA Group to the Quality Manager's Organization. A review of selected QCPs and QCIs indicated the procedures were receiving adequate review. This item is closed (for additional details see section VI.A).

B. R-81-28-WBN-20, All Aspects of QA Program Not Audited

From interviews with the CQAB PSS supervisor and a review of OQA Verification Plans, it was determined that sufficient progress has been made on this item to permit closure. (See section VI.A for additional details.)

VI. DETAILS

A. Division of Construction Quality Assurance/Control Program and Organization

The Division of Construction (CONST) QA/QC programs for nuclear plants under construction were prescribed in the CONST Quality Assurance Program Manual (QAPM) and for training and qualification of personnel performing or verifying activities affecting quality in the CONST Quality Assurance Indoctrination Training and Qualification Program Manual (QATM). The policies and procedures of these manuals were intended to specify quality program requirements to be implemented at nuclear projects under a construction permit. They were required to reflect licensing commitments of the Topical Report and OEDC policy as expressed in the Program Requirements Manual (PRM) and the Interdivisional Quality Assurance Procedures Manual (ID-QAM). CONST QAPM and QATM requirements were to be, in turn, implemented at Watts Bar (WBN) and Bellefonte (BLN) Nuclear Plants directly by site-approved quality control procedures and instructions (QCPs and QCIs).

Through the "tiered" arrangement of quality requirements, activities affecting quality performed at the sites should have been in accordance with the licensing requirements of TVA Topical Report TVA-TR-75-1A, Revision 7, as approved by the U.S. Nuclear Regulatory Commission (NRC). NRC comments on and/or approval of the Topical Report, Revision 7, were due on October 12, 1983, but were not received. Due to circumstances beyond TVA control, NRC comments on Revision 7 may not be received until December 1983. In the interim, the Manager of the Office of Quality Assurance (OQA) issued a memorandum to OEDC and POWER Office Managers on October 20, 1983, announcing full implementation of the Topical Report Revision 7 regardless of NRC approval. The memorandum also announced that the organizational transition had been completed.

The organizational transition referred, in part, to the creation of the Quality Manager's Organization (QMO) at BLN and WBN and the CONST Quality Engineering and Support Staff (QESS) at the division level, as well as the quality performing and assuring functions for which they were responsible. The Quality Managers' organizations are described in section VI.B. The Quality Engineering and Support Staff (attachment 1) was primarily reponsible for developing and maintaining the division-level quality policies and procedures (QAPM and QATM), under the supervision of the Assistant Manager of CONST.

NSRS reviewed the CONST Quality program prescribed by the QAPM. It consisted of Quality Assurance Program Policies (QAPPs) and Quality Assurance Procedures (QAPs), approved at the appropriate management levels. The manual was organized to sequentially address each of the 18 criteria of 10CFR50

Appendix B. Generally, QAPPs required that programs be established and documented in accordance with upper-tier TVA requirements. QAPs were more detailed, providing information and assignment of responsibilities to CONST organizations for assuring that programs were implemented and controlled. It was apparent from this review and from interviews with CONST management that significant effort had been expended to upgrade and strengthen the QAPM and to account for the recent organizational and functional changes.

No major omissions were identified by NSRS in the division-level program, which were not addressed by CONST management. Corrective measures to account for the absence of detailed division-wide requirements for trend analysis of deficiencies and failures, and reporting thereof, were under active consideration by CONST, but a determination on inclusion in division-level procedures had not been made by completion of the NSRS review. CONST management was also aware of the potential for continuing program changes which may be necessary as a result of OQA's forthcoming Management Policies and Requirements (MPRs), which are intended to implement the topical report and are currently in the development and/or conceptual stages. NSRS reviewers noted that both BLN and WBN were using the Inspection/Rejection Notice (IRN) system, prescribed by site procedures, but without benefit of a controlling division-level procedure. The result of this situation, discussed in further detail in section VI.B.3, was a significant degree of inconsistency of philosophy and application in the IRN system between the two sites. Additional differences of implementation of QAPPs and QAPs between sites were apparent and are described in Section VI.B, "Quality Manager's Organization and Program Implementation."

In interviews with site Quality Managers, NSRS heard that, occasionally, division QAPs which require site action are received at the site with insufficient time to establish and implement the required program prior to the effective date of the QAP. This criticism was considered valid, although not indicative of a general breakdown, since site management was required to review and approve division-level policy and procedures in accordance with QAPP 5 of November 21, 1983, prior to division approval. In an effort to improve communication between projects of potential quality problems, CONST had replaced the information notice system with QAP 16.7, "Quality Bulletins," revision 0 of October 19, 1983. This procedure had been recently implemented and it was too early to determine its effectiveness although it was considered an improvement to the previous system because it required investigation and response by the site into problems identified by the Quality Bulletins. At the time of the review, six Quality Bulletins had been issued, three to each site, with responses due early in December 1983.

From interviews with CONST management in Knoxville and a review of items of correspondence, it was apparent that CONST and OQA have established communication channels at all levels. Meetings have been held to discuss differences of opinion or strategy on such key issues as deviation control and quality records. While not all disagreements are yet resolved, their working relationships appeared to be effective and should facilitate CONST involvement in the development and implementation of MPRs necessary to minimize their potential disruptive impact.

In an effort to determine that OQA intended to review the status and adequacy of the CONST QA/QC program and activities, NSRS reviewed the three-year, annual, and quarterly verification plans recently issued by Construction Quality Assurance Branch (CQAB) and interviewed the supervisor of the CQAB Planning and Support Services Section. The review was inconclusive because the documented annual and three-year verification plans do not detail the scope and depth of the scheduled verifications, i.e., audits and surveillance. The CQAB quarterly plan is sufficiently detailed to permit assessment of planned coverage, but due to its limited range, does not attempt to assure verification of all aspects of the CONST QA/QC program. The CQAB supervisor interviewed by NSRS was confident that the results-oriented audits and surveillances scheduled would address all aspects of the program and allow an OQA assessment of program adequacy. Since the Verification Plans have been approved and issued, and since audit responsibility has shifted from CONST to OQA for construction quality programs, NSRS determined that corrective action for previously identified item K-81-28-WBN-20, All Aspects of the (CONST) QA Program not Audited was complete to the point that the item is closed.

Quality Program - Quality Manager's Organization

As stated, the sites were required to implement the quality program by the use of site-approved procedures and instructions. The WBN program was delineated in the Quality Control Procedures (QCPs), Quality Control Instructions (QCIs), and Quality Control Test Procedures (QCTs). All engineering and quality control personnel were required to receive training and be qualified in the procedures, instructions, and test procedures applicable to the function(s) in which they are engaged. In addition to the training, quality control personnel (inspectors) were certified by examination to the QCPs and QCTs applicable to the quality activities which they were performing.

The quality program at BLN was contained in the quality control procedures (QCPs) and construction test procedures (CTPs). All engineering and quality control personnel were trained and qualified in the QCPs and CTPs applicable to the functions they perform. Also, quality control personnel (inspectors)

were certified by testing (written and/or oral) to the QCPs and CTPs that pertain to the quality activities that they were performing.

A noted difference between the two programs was that WBN had segregated "administrative procedures" into separate documents that were titled Quality Control Instructions. BLN had procedures that the site viewed as administrative, but they were contained in the Quality Control Procedures. However, BLN like WBN did not require inspectors to be certified to these "administrative procedures." Interviews with site QC personnel revealed the following three concerns related to the quality program.

1. Hanger Inspection Program

Mechanical, electrical, instrumentation, and hanger QC personnel (inspectors) at WBN performed final visual examination of support welds. In addition to this function, they also performed a final support installation inspection. Each unit was responsible for the supports in their respective discipline. With the exception of the Hanger QC Unit, the QC units were inspecting supports in accordance with criteria from typical support drawings (i.e., 47A050-series, 47A053-series, etc.). Additional criteria, exceptions, and references for these typical supports were contained in general notes associated with the drawings. Interviews with WBN QC inspectors revealed that these general notes were a great source of confusion. The notes were described as vague and open to interpretation as illustrated by the lack of agreement between engineering and QC as to the requirements of the notes. Inspectors also stated that the general notes were so ambiguous that any installed support could be accepted by using them. Upon examination by NSRS reviewers of the notes, it was noted that there was a total of 37 pages of general notes for the 47A050 drawing. These notes were unordered and had 27 open Field Change Requests (FCRs) issued for them. From interviews of WBN upper-level management, it appeared to NSRS that they were not fully aware of this problem. Interviews with QC inspectors at BLN revealed that the same problem existed there but not to the extent as at WBN.

2. Inspection Rejection Notice (IRN) Program

Interviews with WBN personnel revealed that the general attitude toward IRNs was that they were not useful nor serve any purpose. Most WBN inspectors concurred with this conclusion and also stated they did not write IRNs anymore. It appeared from interviews with BLN inspectors that they did not fully understand the IRN system. This lack of understanding could be attributed to the fact that the BLN site had only recently implemented the IRN

procedure (October 1983). However, all the inspectors stated they had received training on BLN's IRN procedure. For additional details pertaining to the IRN program see sections VI.B.3 and 4.

3. Engineering - Quality Control Interface (Engineering Support)

The engineering-quality control interface was an area that was discussed with selected inspectors and quality control supervisors at both sites. The NSRS reviewers focused on the information flow and the adequacy of the information from engineering to inspection units. At WBN interviews with QC inspection personnel revealed that a very small percentage of those inspectors interviewed rated the interface (support) as good. The majority of inspectors described the support they received from engineering as less than adequate. The following are some of the concerns voiced by inspectors:

- Paperwork and/or forms were not consistently completed properly by engineering personnel.
- Work packages prepared by engineering did not contain all necessary documents to perform inspections.
- Field-issued drawings received inadequate engineering review.
- Inspectors provided to engineering personnel informal training on procedures and requirements by making them aware of necessary documents and proper completion of documents required to perform inspections.
- There was difficulty getting engineers to the field (problem locations).
- Work was not consistently ready for inspection when requested.

Generally, however, the quality control supervisors described the engineering support as adequate. One supervisor perceived the problem as engineering lacked experienced personnel. The assistant quality managers rated the support as adequate but one did state that he had heard complaints from inspectors that engineering was not performing their duties prior to requesting an inspection.

NSRS interviewed relatively few engineering personnel (at BLN or WBN) concerning this issue. As a result, incomplete input was received from WBN engineering as to the

validity of engineering-quality control interface problems. However, WBN management should consider this issue since the majority of QC inspectors interviewed perceived interface problems.

At BLN interviews with inspectors and QC supervisors revealed a different view of this interface (support). The majority of people interviewed described engineering support as adequate or better. One inspector did state that he had problems with getting requests for inspection of items that were not ready. The unit supervisor substantiated that this had been a problem in the past but that engineering had improved.

QMO Description of Transition Plan Responsibilities

As a result of the OQA Transition Plan (OQA 830222 403) and as described in proposed Topical Report, Revision 7, the QMO was directed to assume the responsibility for selected QA practices previously performed by CONST QAB. Among those transferred practices were:

- Perform independent review and approval of site-generated quality procedures and documents
- Review of and concurrence with NCRs

NSRS observed that site procedures had been appropriately revised to address QMO responsibilities in these areas. From a review of selected QCIs and QCPs, it was apparent that the QMO staff was performing review of procedures and that the procedures were approved by the Quality Manager.

In an interview with the Quality Manager at WBN, he stated that an attempt was being made to augment his staff section to provide a wider range of expertise for the review of procedures and documents.

In NSRS Report R-81-28-SQN, item R-81-28-WBN-14 had been opened against CONST QAB, site QA unit for performing inadequate procedure reviews. As explained above, since this function was transferred to the QMO, and verified by NSRS to be appropriately procedurally controlled and implemented, R-81-28-WBN-14, Inadequate Procedure Review is closed.

B. Quality Manager's Program and Organization - Implementation

1. QM Organization

The QMO at WBN was structured at a level comparable to the Construction Engineering (CE) and Construction Superintendent (CS) organizations. The Quality Manager (QM)

position was classified as M-7, which was the same rating as the CE and the CS. All three managers reported directly to the project manager, thus giving each organization equal input into the decision-making process. The QM had three assistants (M-6s) who had quality units assigned to them. One Assistant Quality Manager at WBN had the responsiblity for the technical services units (i.e., Document Control Unit, Procedure and Training Unit, Nuclear Licensing Unit and the N-5 Unit). These units did not perform quality control inspection functions. The two remaining Assistant Quality Managers were responsible for units which provided inspectors for various disciplines (i.e., civil, electrical, instrumentation). All the units, whether performing inspection or technical service functions, had managerial supervisors. The Inspection Unit supervisors were classified at the same level (M-5) as their counterparts in the engineering and craft units. The QMO at BLN was essentially the same in structure as the one in effect at WBN. From an interview with the WBN Project Manager, NSRS learned that several meetings between the projects had been held prior to the implementation of the QMO. These meetings were for the purpose of designing the QMO so that each site would be the same. Interviews with site personnel (WBN and BLN) revealed only one major difference in organizational functions.

At WBN the Electrical, Instrumentation, Mechanical, and Hanger Quality Control Inspection Units performed visual welding inspections. These inspections were final visual examinations for welds made on typical seismic supports. At BLN all welding inspections were done by the Welding Quality Control Unit.

From a review of 1983 Management Performance Goals and Appraisal Summaries (MAS) and Job Descriptions for selected QMO management personnel, it appeared that increased emphasis had been placed on achievement of quality activity and administration goals. Production schedule and cost-related goals had been de-emphasized, although, as reasonably expected, not eliminated. MAS goals for fiscal year 1984 were still being developed for QMO personnel. Quality managers at both sites explained they would probably remain similar to those for 1983, but were awaiting division-level input prior to submission.

Interviews with WBN and BLN QC personnel indicated that inspectors had no concerns of harassment or interference from craft, engineering, or their own management. The majority of inspectors felt that forming the QMO was a good decision because they perceived that it gave the QC groups independence from engineering, provided them with a clear understanding of their responsibilities, and/or put them under a supervisor who was responsible only for

quality. Most inspectors stated that the new organization had not changed the way they performed inspections (i.e., they were getting a quality product previously and were getting a quality product now). However, most inspectors related to the NSRS reviewers that they had not been informed why the organization was formed or what new functions it would be performing. In essence, inspectors stated all they had been told was the QMO was being formed and they would be a part of the organization. Some managers at WBN and BLN indicated they did not have a good understanding why the organization was created because they hadn't received any more information than the inspectors.

2. Training and Certification Programs

The NSRS activities in the areas of QC training and certification consisted of a review of the organizations within the Division of Construction and the QMO which were responsible for those activities. The review process included a review of upper-tier documents; site implementing quality control procedures (QCPs); quality control instructions (QCIs); training/certification documentation; general program administration and personnel interviews.

Collectively the review indicated that the overall CONST QA/QC training and certification program was in compliance with upper-tier requirements and site specific implementing instructions. The review also identified several areas of programmatic weaknesses and inconsistencies in the interpretation and implementation of the CONST QA Indoctrination Training and Qualification Program Manual (QATM). The QATM was developed by the CONST Quality Engineering and Support Staff (QESS) to delineate the training and qualification requirements for personnel performing activities affecting quality. The QATM was issued for implementation on June 1, 1982.

The concerns identified with the QATM were based upon interviews with QMO training personnel including QC unit personnel and a comparison of QATM implementation between WBN and BLN. The implementing specifics of the QATM will be discussed under the respective site findings. The following discussion addresses the generic concerns identified in the QATM as they apply to the overall QA/QC training and certification program.

a. Lack of Definitive Guidance in the Development and Implementation of Training Programs:

The QATM failed to identify training program parameters for engineering, craft, and QC personnel. For example, QATM Section II, "Experience, Training,

and Qualification of Personnel not Requiring Certification," (2.1, 2.2, and 2.3) failed to adequately specify levels of acceptable experience for evaluation of new hires, content of on-the-job training programs, or to establish requirements that qualify an individual to perform a required function.

- Specific Organizational Responsibility for QA/QC Training:

  The QATM failed to specify organizational responsibility for craft and engineering QA/QC training.

- Failure to Establish Guidance to Determine Effectiveness of Training Programs

  The QATM failed to provide a methodology of determining the effectiveness of the training and certification program. However, it was noted that BLN had recently instituted a training effectiveness evaluation program for craft and engineering personnel. (see section V.B.2.b for details).

a. WBN Training and Certification Program

The QA/QC training and certification program was performed by three separate organizations under the control of the Project Manager. The Quality Manager's Organization (QMO) was responsible for general employee indoctrination, QC inspector training and certification, and the monitoring of craft engineering training. The Construction Engineering Organization (CEO) was responsible for engineering unit personnel QA/QC training. The Construction Superintendent's Organization (CSO) was responsible for craft QA/QC training.

Requirements for the training of construction personnel were identified in the following site procedures:

QCI-1.11-1, R2, "Indoctrination and Training Program"

QCI-1.11-2, R5, "Qualification/Certification of Construction Quality Control Inspectors"

QCI-1.11-3, R0, "Qualification Program for Engineering Functions"

QCI-1.11-4, R1, "Craft Qualification/Certification Program"

QCI-1.37, R7, "Quality Assurance Organization -Watts Bar Nuclear Plant"

The NSRS review at WBN entailed a comparison of the above procedures with project training activities and QATM requirements. All procedures reviewed were in accordance with QATM requirements.

Quality Manager's Organization (QMO)

QMO training and certification responsibilities were divided between the Procedures and Training Unit (PTU) and individual QC units, i.e., Hanger QC, Mechanical QC, etc. The PTU had two primary responsibilities: the administration of general employee indoctrination and QC inspector certification. Indoctrination training was conducted by the PTU staff on an as-needed basis. A review of the indoctrination course outline and previous attendance documentation noted that applicable requirements identified in QATM, section I, and QCI 1.11-1 had been addressed. The PTU role in QC inspector certification was administrative while the individual QC units provided the actual training. The PTU developed, administered, and graded the various QC examinations which were used for inspector certification. The results of those examinations were subsequently transferred to the Personnel Certification Record (PCR) and were kept on file in the Document Control Unit (DCU). The PCR served as the official inspector certification documentation. A random review of PCRs for QC inspector personnel indicated no discrepancies in the correlation between required procedure certification and documented certification.

In support of QC units, the PTU developed lesson modules for each procedure which were required for QC inspector certification. The modules were structured in a standard lesson format, i.e., title, objectives, references, training aids, hand-outs, etc., and were designed to be used with the certification procedures. Interviews with QC unit training personnel indicated that the modules were utilized primarily for training of new personnel. Modules were revised by the PTU and reissued to QC units as necessitated by procedure revision and/or modifications. The NSRS review indicated that the process was working as designed, and although not required by site or division-level procedures, modules were available and in use at most QC units. Additional administrative support, such as classrooms, training aids, and adjunct instructors, was provided by the PTU to QC units as needed.

The PTU monitored QA/QC training for craft, engineering, and QC unit personnel. Monitoring activities consisted of a review of attendance documentation and occasional observation of classroom activities. The monitoring program was designed to assure that training for required procedures was being conducted in accordance with QATM and QCI requirements. Review findings indicated that the program was effective in monitoring requirements implementation. However, interviews with craft, QC, and engineering training personnel also indicated that the monitoring program was considered to be of limited value. The predominate criticism was directed toward the lack of feedback from PTU monitors and the lack of authority in the program to achieve improvements in the quality of training.

Construction Engineering Organization

The Construction Engineering Organization (CEO) was responsible for providing the appropriate procedural training to engineering unit personnel. That responsibility was accomplished by training personnel within the individual engineering units, i.e., mechanical, electrical, hanger, etc. The CEO training program in QA/QC practices consisted of indoctrination and basic training in various quality control procedures. QCI 1.37, "Quality Assurance Organization - Watts Bar," identifies specific procedures which were required for training and/or certification by engineering and quality control personnel. Procedural training needs were based upon engineering disciplines and quality work activities performed by individual engineering units. A random review of training implementation and subsequent documentation, performed against QCI 1.37 procedural training requirements, revealed no discrepancies.

Construction Superintendent's Organization

The CSO was responsible for providing QA/QC training to craft superintendents through hourly foremen. In addition, the hourly foremen, which represented the various craft disciplines, were providing QA/QC training to journeymen. The journeymen training program consisted of one-hour classes given twice a month (every other Tuesday of each month). The program was structured around the General Craft Training Module which was a composite of 18 QCPs. The module was issued on February 15, 1985 and contains the applicable aspects of each QCP which requires interface between craft, engineering, or QC personnel. The Craft Training Module was revised as

necessary. Those revisions were then addressed in scheduled training session and documented in accordance with training procedures. Training documentation was administratively processed by the Training Office for inclusion in the project training printout.

In an interview with the Assistant Supervisor, M&A Unit, he stated that the effectiveness of craft training was also monitored through the project trend analysis of IRNs, and instruction evaluation forms which were given to the craft once every three months. The inherent disadvantage of measuring training effectiveness through trend analysis appeared to be in that an individual's knowledge level or ability could not be determined until after the work had been performed. Further, the trend analysis must be structured to detect various levels of performance (reference section VI.B.3 for other details of NSRS trending concerns).

Instruction evaluation forms were provided to craft personnel every three months as a feedback mechanism to determine the quality of the QA training sessions. During the course of the review construction training personnel were unable to substantiate the use of the form for the preceeding three months. The decision to utilize the evaluation forms once every three months (which is equal to an evaluation of one out of every six classes) was based upon the economic consideration involving the pay rate per craft versus the time it would take to complete the evaluation (approximately 15 minutes). Construction supervisors felt that the cost incurred by completing the form at the end of each training session could not be justified and that the same effect could be achieved by using the form on a less frequent basis. Personnel interviews indicate that the forms had no practical application due to their limited use and the lack of substantive comments by craft personnel. However, at present the evaluation forms do provide the only basis of feedback of craft training. The quality of feedback information could not be determined by NSRS due to the lack of evaluation forms available for review.

The overall review finding for the WBN QA/QC training program was positive in that no items of nonconformance were identified; QA/QC training was a formalized element of the construction program; and the training certification program had improved over last year. The major concern identified by NSRS was the lack of a formal means to determine the effectiveness of training. There did not appear to be

any concentrated management effort in that direction at the time of the review. The methods which were in effect (i.e., trend analysis, evaluation forms, PTU monitoring, etc.) were informal, were not consistently applied throughout the WBN construction organization, and were considered by most personnel to be ineffective.

b. BLN Training and Certification Program

The QA/QC training and certification program at BLN was similar to that of WBN in that the three principle organizations, QMO, CEO, and CSO, were responsible for specific training and/or certification activities and were under the direction of the Project Manager. The principle documents that controlled the BLN training program were: QCP-10.29, R5, "Quality Assurance Training Program," and QCP-10.30, R4, "Craft Quality Assurance Training." The NSRS review process of the BLN training program was identical to that of WBN in that the above procedures were compared against project activities and QATM requirements.

The QMO was responsible for the organization, content and adequacy of the QC inspector training, qualification, and certification program; the overview of indoctrination and QA orientation; and the general monitoring of craft, engineering, and QC training/certification. The QMO responsibilities were divided between the Procedures and Training Unit (PTU) and QC units.

The PTU developed and administered certifying examinations for quality control inspectors. Examinations were based on procedural requirements for the inspection and/or testing of quality related activities and/or processes. A review of QCPs and associated testing material indicated that certification examinations were comprehensive in relation to procedural requirements. The administrative program utilized to document, update, and track individual QC inspector certification was functioning in accordance with established procedures. A random review of personnel certification records revealed no discrepancies in required inspector certification.

The employee indoctrination program is conducted by the Project Training Officer (PTO) and was developed, coordinated, and monitored by the PTU in conjunction with CEO and CSO. The course consisted of a basic introduction and general overview of QA activities at BLN. The program was mandatory for all new employees with re-indoctrination every three

years. Attendance was documented on Craft and/or Group Training Reports and maintained by the PTO for craft personnel and by unit training officers for engineering/QC personnel.

PTU monitoring activities in the area of QC inspector training involved periodic reviews of individual QC unit training records, on-the-job training programs, and observation of classroom instruction. Reviews were based on QC unit activities and were considered as beneficial by unit training personnel. PTU monitoring of craft and engineering training involved random observation of classroom activities, training scheduling and subsequent documentation reviews and personnel testing. The personnel testing began in August of 1983 in response to an INPO report which noted that BLN did not have a feedback program that allowed management to evaluate the effectiveness of the training program.

The testing program was based on specific QC procedures on which craft and engineering personnel were required to be trained. A typical test consisted of five questions which were directly related to a specific quality control procedure (QCP). Tests were administered to craft personnel during scheduled training sessions and to engineering at random. During scheduled training sessions a pre-test, which relates directly to the QCP under discussion, was administered, training in the QCP was provided, and a post-test was given. Random testing was conducted by the PTU selecting personnel from the various engineering disciplines and administering one test on any QCP on which those individuals were required to be trained. The results of the testing were compiled by the PTU and provided to the Quality Manager. At the time of the NSRS review the Quality Manager, in conjunction with engineering and craft supervision had not determined how the testing data was to be utilized to improve personnel knowledge and training efficiency.

The NSRS review of the testing program and related documentation revealed several significant concerns, the first of which deals with the inordinately high rate of failure among craft and engineering personnel in QCPs. For example, the following data provided by the Assistant Quality Manager represents 18 craft training sessions in applicable QCPs and 5 random tests of various engineering disciplines.

Craft Testing Results

Procedure	No. Tested	Pre-Test Failure Rate	Post-Test Failure Rate
QCP-1.2	3	100%	33%
QCP-1.3	6	50%	0
QCP-2.8	6	83%	33%
QCP 2.15	3	67%	67%
QCP-3.2	4	100%	0
QCP-3.3	6	100%	0
QCP-6.7	3	67%	0
QCP-6.16	1	100%	100%
QCP-7.5	13	100%	54%
QCP-7.9	9	78%	33%
QCP-8.1	6	33%	0
QCP-8.2	1	100%	100%
QCP-10.2	5	40%	20%
QCP-10.4	8	75%	13%
QCP-10.5	11	64%	36%
QCP-10.6	7	86%	0
QCP-10.9	3	0	0
QCP-10.33	8	100%	0

Engineering Testing Results

BNP-QCP-2.2 R14, Total number tested: 10
(Civil)

Satisfactory: 7
Unsatisfactory: 3
Failure rate: 30%

BNP-QCP-6.13 R6, Total number tested: 10
(Civil)

Satisfactory: 5
Unsatisfactory: 5
Failure rate: 50%

BNP-QCP-6.10 R5, Total number tested: 9
(Mechanical)

Satisfactory: 8
Unsatisfactory: 1
Failure rate: 11.1%

BNP-QCP 3.13 R6, Total number tested: 8
(Instrumentation)

Satisfactory: 3
Unsatisfactory: 5
Failure rate: 62.5%

BNP-QCP 3.13 R6, Total number tested: 10
(Electrical)

Satisfactory: 1
Unsatisfactory: 9
Failure rate: 90%

The second concern addressed the corrective action for personnel who fail random testing and/or training posttesting. The NSRS review noted that craft and engineering personnel who failed QCP testing continued to work but did not receive remedial training nor were there any other forms of corrective action to assure that such personnel were adequately trained and qualified prior to performing quality related activities. Conversations with the Quality Manager and Project Manager indicated that they were aware of the need to improve the effectiveness of training and that several options were being considered, including retraining and testing of personnel who fail.

Support activities of the PTU involved the coordination of training aids, classrooms, and instructional personnel. Training support was available to craft, engineering, and QC units as needed and were considered adequate by the training personnel of the various organizations.

Training for QC inspectors was conducted by individual QC units. A review of Hanger, Electrical, Instrumentation, and Mechanical QC Units indicated that the structure and format of training program among the different units were similar.

Though all unit training programs reviewed were meeting Construction Quality Training and Qualifications Program Manual and QCP requirements, the depth of training programs varied considerably. Most noteworthy was Mechanical QC. Each element within the Mechanical training program was clearly defined. For example, the subject and approximate duration of training were defined for selfstudy, classroom sessions, and on-the-job training. Specific learning objectives were defined for each subject. Requirements for the documentation for each phase of the program were clearly defined. The depth of instruction and subsequent testing assured that trainees were amply qualified prior to certification by the PTU. Procedural certification for QC inspectors requires a passing score of 70 percent, Mechanical QC requires a 90 percent score during training in the same procedure. Other QC units' programs, while adequate, did not have the depth, clarity, or organization which was evident in the Mechanical QC Unit.

The Construction Engineer Organization (CEO) was responsible for conducting procedural training and implementing on-the-job training for engineering personnel. Training was based on applicable quality

control procedures and construction test procedures (CTP) for the basic engineering disciplines. Required training was specified on Unit Certification/Training Requirements List which identified specific procedures for each engineering unit. The list was reviewed and approved by the PTU. CEO training was documented on the Group Training Report and was distributed to the PTO for inclusion in the Bellefonte Certification/Training Computer Program. In addition, the Unit Training Officer (UTO) maintained a copy on file. The NSRS review of the CEO training program administration indicated that the program was being implemented and documented in accordance with the QATM and site training procedures.

The Construction Superintendent Organization (CSO) is responsible for the training of craft superintendent, assistant craft superintendent, and hourly foremen. The CSO program consisted of indoctrination, QCP, and CTP training. Training requirements for respective craft disciplines were identified in QCP-10.30, "Craft Quality Assurance Training." The procedure also identified documentation requirements, reindoctrination timeframes, and the general administrative process for craft training. The NSRS random review of craft training practices revealed no discrepancies.

Observed Differences Between Project Programs - WBN/BLN

During the course of the NSRS review there were several significant differences observed in the implementation of the WBN and BLN quality assurance training programs. The observations were made in the areas of craft training, training effectiveness evaluation, and PTO program support. The significance of each area was based upon the existing and potential benefits which the particular activity afforded the program, the lack of a similar activity at a corresponding project and the willingness of project management to utilize nonrequired training/evaluation techniques to improve the long term effect of QA training.

The Construction Superintendents Organization (CSO) at both Watts Bar and Bellefonte were responsible for the training of craft superintendents, assistant craft superintendents, and hourly foremen in applicable QA/QC procedures. (See section VI.B.2.a and b for respective organizational programs.) Craft training activities were similar at WBN and BLN due primarily to QTP requirements. The most noted

difference was identified at WBN where craft journeymen were receiving formal, documented training in QC procedures whereas at BLN they were receiving only the general QA indoctrination.

Journeymen training was conducted by craft foremen at WBN and was designed to enhance the quality assurance knowledge of craft personnel who perform quality work activities. Interviews with CSO personnel at WBN indicated that the journeyman program was considered to have had a positive effect on quality activities. In addition, the assistant construction superintendent indicated that the program would also include the use of engineering personnel to provide technical and instructional assistance in the future. The evaluation of the program by the CSO was based on a review of IRNs by CSO training personnel.

Overall, NSRS considered the journeyman training program as a positive step toward improving quality-related work activities. BLN did not have a program to provide formal training in QCPs directly to journeymen in effect at the time of the NSRS review.

The Construction Quality Training and Qualification Program Manual (QTP) did not require or provide a structural format to measure the effectiveness of QA training. The BLN project was measuring training effectiveness through random testing of craft and engineering personnel. WBN's QAT measured only craft personnel training effectiveness through identification of significant activities from the IRN trend analysis, and use of evaluation forms.

The impetus for the BLN program was in response to the 1982 Self-Initiated INPO Review in which TVA committed to establishing a feedback program that would require managers to evaluate the effectiveness of each training program undertaken. (See section VI.B.2.b for details of the BLN training evaluation program.) The WBN quality manager indicated that they were supposed to evaluate the BLN INPO findings and TVA responses for applicability at WBN. The NSRS review determined that the effectiveness of training was being evaluated for craft personnel through the use of QA trend analysis. Engineering training was not being evaluated.

The QMO Procedures and Training Unit (PTU) at WBN and BLN were primarily responsible for general employee indoctrination training, QC inspector certification, and the general monitoring of craft, engineering, and QC training. The PTU also provided

administrative support for project training activities (see section VI.B.2.a and b for PTU programs). The most noted difference between the WBN and BLN PTU programs was in the area of training support. Specifically, the development of lesson modules by the WBN PTU. The lesson modules were designed to be used in conjunction with procedures which were required for QC inspector certification. The modules also identified reference material, training aids, and technical specifics for the procedures on review. (See section VI.B.2.a for lesson module details.) The BLN PTU did not provide equivalent material but relied upon independent QC units to develop necessary instructional aids.

Other differences between the WBN and BLN QA training programs were of minor significance and for the most part reflected individual project administrative preferences.

3. Corrective Action Programs

This part of the review was conducted to determine that site practices for identifying deficiencies and obtaining timely corrective actions were prescribed procedurally and demonstrated effective. Among the methods available to achieve those purposes, which NSRS reviewed, were allegation and employee concern reporting, stop work authority (and use), the nonconformance report (NCR) and inspection rejection notice (IRN) systems, use of Quality Bulletins, and trend analysis. Also reviewed were the site actions in response to INPO findings associated with the evaluation of the effectiveness of craft and engineering training. This information is detailed in section VI.B.2.b and c.

a. Watts Bar Nuclear Plant (WBN)

Allegation Reports - The initiation and investigation of employee allegations was administratively controlled by WBNP-QCI 1.31, revision 2 of April 17, 1982. This instruction provided for independent investigation of, and disposition and necessary corrective action to, employee allegations. From a review of completed allegation reports and logs, it was determined that applicable allegation reports had been investigated and resolved by an assistant quality manager and that no allegations had been filed in 1983, as of November 2, 1983. CONST-QAP 16.4, "Allegations, Employee Concerns, and Employee Differing Opinions," revision 1 of October 19, 1983, identified the difference between an "allegation"

and an "employee concern" requiring programs for handling and resolving each. The Watts Bar QCPs and QCIs did not contain a procedure for specifically controlling the handling of employee concerns and differing opinions as did the QCPs for Bellefonte, nor did WBNP-QCI 1.31 address employee concerns as differing from allegations.

This situation was considered an example of inconsistency of program application between sites rather than a site program omission since other methods, such as TVA Code II, were available and have been used by personnel to voice concerns and differing opinions.

Stop Work Authority - WBNP-QCI 1.32, revision 3 of September 19, 1983, "Stop Work Authority," grants this authority to the Quality Manager (as well as to the Construction Engineer). From a review of records and the stop work log, it was determined that stop work was initiated four times in 1982 and once in 1983. The stop work order issued in 1983 was still in effect, pending resolution. This phase of corrective action appeared to have been adequately prescribed and implemented.

Nonconformance Reports (NCRs) - WBNP-QCI 1.02, revision 8 of October 17, 1983, "Control of Nonconforming Items," had been revised to comply with recently revised requirements of division policy and procedures. It appropriately specified the responsibilities of the QMO for review of NCRs, dispositions, and NCR trend reports. Selected NCRs, logs, and trend reports were reviewed by NSRS. It was also observed that training in the procedure had been provided to engineering and QC personnel. This phase of corrective action appeared to have been adequately prescribed and implemented.

Inspection/Rejection Notices (IRNs) - WBNP-QCI 1.02-1, revision 5 of April 20, 1983, "Inspection Rejection Notice," defined and controlled the use of the IRN. The procedure required that QC inspectors write IRNs to document deficient or incomplete work upon completing a required inspection if the identified problems cannot be corrected during the inspector's shift and unless the problem constitutes a nonconforming condition (requiring NCR vs IRN initiation). The procedure also required that QC units and their management prepare and review monthly IRN "status" reports in order to disclose and correct potential adverse trends. IRNs were directed by the QC units to crafts and/or construction engineering for resolution.

NSRS reviewers found through interviews with QMO/QC personnel, observation of inspections in progress, and reviews of IRN logs and trend reports that apparent wide variations existed among QC units regarding the interpretation of the intent of the procedure and its implementation. Some inspectors stated in interviews and demonstrated during observed inspections that they did not write IRNs because they caused problems with the crafts. They would instead void the requested inspection explaining to the craft involved the extent and nature of the deficiencies. The craft could then perform the work, regardless of the deviation, and again request inspection when ready without the documentation of an IRN. This informal process did not appear to be in accordance with the intent of QCP 1.02-1. Information compiled from the seven most recent monthly IRN trend reports is displayed as a matrix in attachment 2. It indicates that the QC units apparently reluctant to issue IRNs are Welding QC, Hanger QC, and Civil QC. The composite average for these units was .077 percent IRNs per "inspection" or 1264 "inspections" performed for each IRN issued. The composite average for the remaining QC units (Mechanical, Electrical, Instrumentation, and Material Services) for the same period was 6.6 percent or one IRN issued for 15 "inspections" performed. The term "inspection" is enclosed in quotation marks since considerable latitude was permitted the units in determining and defining exactly what constituted an inspection. It was stated by the Quality Manager that not all inspections were required to be documented, and especially in the Civil QC Units, one inspection acceptance document could consist of many, perhaps dozens, of "inspections." He also stated that the Hanger QC Unit had to write fewer IRNs now that the "Pending FCN" program was in use (i.e., if a field change notice (FCN) had been initiated on a hanger varying from requirements but unapproved at the time of inspection, the hanger could still be conditionally accepted). These factors could mitigate the apparent extreme disparity among units identified by attachment 2.

NSRS reviewers verified with selected QC units that supervisors were reviewing the IRN log to detect potential trends as required by the procedure. This area is discussed further in Trend Analysis and Reporting, following the next section.

Quality Bulletins (QBs) - At the time of the review there was no site procedure for controlling the review or investigation of Quality Bulletins. WBNP-QCI 1.54, revision 0 of November 15, 1983,

"Handling Quality Bulletins," was approved and issued following the review onsite and appeared to adequately address the requirements of the division procedure QAP 16.7 of October 19, 1983. From a review of CONST QESS Quality Bulletins and the log of QBs, there was evidence that the Quality Manager's Organization had appropriately acted on QBs issued prior to approval of the site procedure. QB 83-15 issued November 4, 1983, associated with inspection of interior weld surfaces was reviewed by the QMO, resolution was determined, and it was returned as required within 30 days on November 17, 1983.

Trend Analysis and Reporting - Information requiring trending at WBN was identified in WBNP-QCI 1.58, revision 0 of May 16, 1983, "Trend Analysis." This procedure specified that nonconformance reports, QQA audit deviations, ASME III survey deficiencies, authorized nuclear inspector's special inspection service reports, NRC inspection reports, and NSRS items were to be reviewed, evaluated, and included in quarterly or semiannual trend analysis reports. The list of items to be trended was more extensive than that required by the division-level procedure QAPP 16 revision 4, addendum 1 of November 16, 1983, and proposed Topical Report Revision 7. However, QAPP 16, revision 4, addendum 1, did not include all items required by proposed Topical Report Revision 7. Responsibility for execution of the trend analysis program was assigned by site procedure to the QMO. Though not specified by the procedure, trending was performed by the QMO's Procedures and Training Unit (PTU).

NSRS reviewed quarterly Quality Trend Analysis Reports of Audit Items (TAAI), Quality Trend Analysis Reports of Significant and Reportable Items (TASR), and the semi-annual Quality Trend Analysis Reports (TA) from 1980 through the present. It was noted that CONST QA (site) had prepared and distributed these reports prior to implementation of the QMO in February 1983. A summary of the data from this review is tabulated in attachments 3 and 4. A statistical analysis of the data was not performed. The format of these reports indicated that raw data from the current report was compared with that of the corresponding previous report, but that a comprehensive or cumulative comparison was not made. Interviews with the Quality Manager and the Supervisor, PTU, revealed that they considered the trending to be of little value. It was stated that among the problems were: a trend had never been identified as a result of the reports, nor had there ever been

substantive feedback from reviewing management. Additionally, the quality, timeliness, and structure of the information accumulated and presented in the reports was not considered adequate to permit identification of meaningful trends. NSRS concurred that the implemented program was ineffective.

Inspection/Rejection Notices were trended by QC units on a monthly basis for review by the Assistant Quality Managers and Quality Manager. NSRS reviewed these reports (attachment 2), and observed occasional questions raised by the QM concerning unit report results. Generally, however, the unit analysis was reported as "no discernable trends." As with the TAAI, TASR, and TA reports, no cumulative data were maintained or reported for analysis. The Quality Manager stated in an interview that through the IRN trend reports he had become aware of a problem of work turned in for inspections which was found to be incomplete upon inspection but that corrective action to resolve this situation had not been undertaken.

It was also noted by NSRS that the unit trend reports provided a baseline for potential "normalization" of data (although this was not performed) by reporting both the number of IRNs written and the number of inspections performed in a given period. However, as previously stated, there was variation between units concerning the meaning of "inspection," which could have reduced the value of this information.

IRN trend reports were not distributed to the project manager, nor to offsite CONST management.

b. Bellefonte Nuclear Plant (BLN)

Allegation Reports - The initiation and investigation of employee concerns and differing opinions and of allegations was administratively controlled by Bellefonte QC Procedures BNP-QCP 10.35, revision 1 of January 3, 1983, and BNP-QCP 10.28, revision 1 of December 10, 1982, respectively. These procedures provided for investigation of concerns and allegations by the QMO. BNP-QCP 10.35 contained provisions for independent investigation of concerns by either the QMO, or in the case of potential conflict, by site QA as well as emphasis on the employee's right to bypass intermediate management levels for resolution of concerns. The following table, extracted from concern and allegation logs

and reports maintained by the QCRU describes the recent history of these corrective action mechanisms:

Employee Concerns and Differing Opinions

	Year Initiated		
	1981	1982	1983
No. Initiated	1	2	1 (Differing Opinion Initiated 8/29/83)
Unresolved (12/1/83)	0	0	1 (Awaits EN DES Action)

Allegation Reports

	Year Initiated			
	1980	1981	1982	1983
No. Initiated	9	7	3	1
Unresolved	0	0	0	0

NSRS noted minor apparent administrative problems with maintaining report files current. Although resolution had been effected, one differing opinion initiated in September 1982 was not closed until questioned by NSRS in November 1983 and the allegation report of 1983 (No. 24) should also have been closed according to the Compliance Supervisor but had not been when reviewed by NSRS.

All reports reviewed for 1982 and 1983 indicated investigation by the QMO as required or permitted by procedure.

Although not directly a part of the review, informal conversations with the departed NRC resident inspector prior to the review indicated that in 1983 he was not receiving the number of allegations reported to him as he had previously experienced. In combination with the above table, this information could indicate an actual decrease in the number of discerned problems and/or an improvement in the "trust" of employees that their supervisors will adequately resolve problems brought informally to their attention. This phase of corrective action appeared to have been adequately prescribed and implemented.

Stop Work Authority - BNP-QCP 10.33, revision 4 of December 12, 1981, "Stop Work Procedure," prescribes the controls and authority for this action. Stop work authority was granted to "Any employee having quality assurance/quality control responsibilities . . . ." This procedure did not reflect the new QMO or reassign responsibilities for evaluation of corrective action. However, from a telephone conversation with the Supervisor of the Procedures and Training Unit on December 6, 1983, it was learned that revision 5 to QCP 10.33 had been approved with an effective date of December 12, 1983, which corrected the situation.

A review of the stop work log and stop work documents maintained by the QMO indicated that the authority had been exercised on three occasions in 1983, six times in 1982, and twice in 1983. Resolution had been obtained on all except the two most recent occasions. This phase of corrective action appeared to have been adequately implemented and with the issue of BNP-QCP 10.33, revision 5 of December 12, 1983, will be adequately prescribed.

Nonconformance Reports - BNP-QCP 10.4, revision 10 of November 1, 1983, "Control of Nonconformances," with addendum 1 of November 23, 1983, had been revised to comply with revised requirements of division-level policy and procedures. It appropriately specified responsibilities of the QMO in initiating, reviewing, and distributing nonconformance reports and verifying corrective action. Revision 10 of the QCP specified that revision 7 was to remain effective for the control of outstanding QC investigation reports (QCIRs) since that program had been replaced by the inspection/ rejection notice (IRN) system described in the next section. Trend analysis requirements for NCRs were not prescribed or referenced by QCP 10.4, but were identified in BNP-QCP 10.41, "Trend Analysis Program."

NSRS reviewers accompanied a hanger QC inspection team during a "peer review" of a previously inspected and accepted Grinnel sway strut. The hanger was observed to deviate from acceptance criteria, requiring initiation of an NCR. Although not written while NSRS was onsite, a follow-up telephone conversation with the lead inspector indicated the NCR had been initiated and assigned number 2547. It was stated by the Quality Manager that this incident was the first such occurrence since "peer review" had been initiated and in the absence of the QCIR system.

This program appeared to have been adequately prescribed. It was considered by NSRS that recent NCR program changes rendered an assessment of implementation adequacy indeterminate. Additional changes to nonconformance reporting and resolution were anticipated by project management when OQA issues a Management Policy Requirement on deviation control.

Inspection Rejection Notices (IRNs) - BNP-QCP 10.43, revision 0 of November 1, 1983, with addendum 1, "Inspection Rejection Notice," provided the administrative control and requirements for the IRN deficiency reporting and correction system. This system replaced the Quality Control Investigation Report system in November 1983 whereby observed or suspected problems were identified for evaluation and resolution by Construction Engineering. According to project management, this was done in an effort to reduce paperwork and improve the productivity of both the crafts and engineering personnel.

The procedure appeared to have provided inadequate and potentially confusing requirements and information. Among the problems noted during the review of the procedure and observation of the inspection process were:

(1) Responsibility for determination of corrective action was unassigned. Correction was presumed to be accomplished by the involved craft.

It was apparently intended that the crafts would involve Construction Engineering if they were unsure about a corrective action, but criteria for making this determination were not specified. NSRS observed a reinspection of a "corrected" IRN condition in which the allowable gap between a hanger base plate and the wall to which it was mounted (by welding and bolting) was excessive. The corrective action taken had been to run a line of cement grout around the gap. As this "correction" was unacceptable, the QC inspector properly rejected the hanger again and wrote a new IRN.

(2) The procedure required the voiding of an IRN if, upon reinspection, the deficiency had not been corrected and the initiation of a new IRN on the same problem. It was not clear how voided IRNs were to be used for trend analysis purposes.

Additionally, the procedure required a weekly report to the QM of IRNs not corrected within five days. It was not clear whether "replacement IRNs," written when an IRN is voided as indicated above, extend the five-day deadline although the stated purpose of the weekly report was to notify management of "areas that require more timely corrective action."

Training had been provided to QC inspectors and engineering personnel in the IRN procedure. However, interviews with selected QC and engineering personnel revealed some confusion regarding the system. Two inspectors told NSRS they were no longer allowed to initiate NCRs. Another inspector stated he would write an IRN only if the problem could be immediately corrected; otherwise, he would write an NCR. One engineering unit supervisor stated he was not sure how the IRN program would work or how it interfaced with nonconformance reporting.

It was noted that the IRN program had been implemented for less than two weeks when reviewed by NSRS. Some degree of confusion and misunderstanding was anticipated and that found was not considered abnormal. Misconceptions should be corrected as the process becomes more familiar.

Quality Bulletins (QBs) - The procedure for describing site actions and responsibilities upon receipt of a CONSF Quality Bulletin, BNP-QCP-10.04, revision 0 of September 7, 1983, consisted of only the division procedure, QAP 15.7, revision 9, 35 pages attached to a cover sheet and table of contents. Section 7.3 of QAP 15.7 does not fully describe management action, requiring responsible (e.g., project managers) to initiate a resolution of the issues, take action as required, and to document and return results to QASD. The entire process for accomplishing this activity is not described in detail. In an interview with the Quality Manager, it stated that no Quality Bulletins had been received at that time. However, subsequent interviews with QASD personnel indicated that three bulletins had been issued and should have been received. Additional investigation revealed that the QBs had been received by the project manager who had delegated them for action to the Construction Engineer instead of the Quality Manager. In a telephone conversation with the Quality Manager

be stated that the project management-agreed practice would be to delegate action for QBs to the Quality Manager.

This situation appeared to be a second example of the expected confusion associated with a new or significantly revised program. Unless continued responsibility, routing, or timeliness difficulties are experienced, the QB site action program intent appeared to be sufficiently straightforward as presently prescribed.

<u>Trend Analysis</u> - Trend analysis at Bellefonte was required to be performed in accordance with BNP-QCP 10.41, revision 0 of September 30, 1983, "Trend Analysis Program." This procedure identified the corrective action information to be trended and provided the requirements for preparation and review of the reports. Items to be trended included IRNs, NCRs, NRC violations, OQA deviation reports, and automated process control reject records. This listing failed to include ASME III survey results and authorized nuclear inspector audit deficiencies requiring trending by the Topical Report proposed Revision 7. In interviews with the Supervisor, Procedures and Training Unit, and the Quality Manager, both acknowledged the omission but stated deficiencies identified by those methods would be reported for trending as site-generated NCRs.

ASME III surveys are required to be performed once each three years and ANI audits once each six months. The value of trending deficiencies from these sources was considered by [illegible] of less importance than review of the deficiencies for potential impact at other facilities, due to their frequency.

Responsibility for execution of the trend analysis program was assigned by procedure to the QMO, with the Procedures and Training Unit responsible for compilation of unit reports and generation and distribution of the necessary project and summary reports. Summary reports of IRN and APC deficiencies were required to identify only those deficiency types which represented five percent or more of the total deficiencies for the monthly period. IRN trend reports [illegible] of inspections performed during the period. [illegible]

audit items and significant items (SAAI and TASK reports). It was noted that these reports had been prepared and distributed by CONST site QA prior to implementation of the QAP in February 1983. A summary of data from this review is tabulated in attachment 4. As with the trend program at Watts Bar, cumulative data for historical comparision was not available in the report. IRN trend reports had not been generated because that program had only recently been implemented (November 1983), but the required format was observed to be similar to that of the previous QCIR trend reports.

In an interview with NSRS, the Quality Manager stated his belief that the new trend analysis procedure should be more effective than the previous method because it required analysis at the unit level as well as follow-up reporting on recommended remedial actions. No quarterly or IRN reports had been generated under the controls of BAP-QCP 10.41, revision 0, at the time of the NSRS review so an effectiveness assessment was not made.

c. Comparison-Corrective Action Programs

NSRS reviewers compared the programs and implementation for five of those previously identified in sections 5.b.3.a. and b. as constituents of corrective action. The purpose of this comparison was intended to identify which programs, or portions of programs, appeared stronger or better controlled at one site than the other due to allowable differences in implementation within the guidance of the CONST QA Program Manual.

Allegation Reports - Watts Bar had no procedure specifically addressing employee concerns and differing opinions, as did Bellefonte. Neither program was observed to be especially active, however, as no allegation reports had been indicated at WBN in 1983 and only one allegation and one differing opinion at BLN.

Stop Work Authority - With the initiation of BAP-QCP 10.33, revision 5 , on December 15, 1983, there should be no substantive difference between the programs at WBN and BLN.

Nonconformance Reports - There appeared to be no substantive differences between these programs at WBN and BLN.

Inspection Rejection Notices - Although recently implemented at BLN, there appeared to be a major philosophical difference in initiation of IRNs between the sites. WBN QC Personnel would not initiate, per procedure, IRNs for deficiencies correctable within the inspector's work day. They may also assign IRNs to the CONST Engineering Group for resolution. Bellefonte inspectors had been instructed to write IRNs for all problems regardless of how quickly resolved. One inspector expressed a belief that if the problem could not be immediately corrected, an NCR should be initiated. The BLN QCP controlling IRNs did not assign responsibility for determining the adequacy of a proposed resolution. There was no division-level procedure for the control of IRNs.

Quality Bulletins - Watts Bar had recently issued a site procedure defining and describing site action in response to a QB. Bellefonte had also issued a procedure, but it consisted of only the division-level procedure as an attachment to a BNP-QCP coversheet. The division-level procedure did not detail site responsibilities or actions in response to a QB but appeared to be straight-forward in intent.

Trend Analysis - The most significant difference in implementation of the trend programs between the sites was observed in the distribution of reports and the method of determining the baseline of reported information. At WBN monthly IRN trend reports were maintained internal to the QMO. IRNs were reported as a percentage of inspections performed (although "inspection" was not well defined.) At BLN, IRN trend reports were distributed to the Construction Engineer, Project Manager, and offsite to the Assistant Manager, CONST. To be reported, however, the number of IRNs associated with a given defect, cause, or origin, had to constitute five percent or greater of the total IRNs initiated for the summary report period, regardless of the number of inspections performed. It was also noted that the two sites' implementing procedures required different deficiency report types to be included in trend reports.

There was no division-level procedure controlling trend analysis, although the subject was reported under consideration.

4. Inspection Process

As a part of the QMO review, NSRS observed inspectors performing inspections on selected activities at each site. An activity chosen was hanger (support) inspection. The following accounts of hanger inspection were gathered by NSRS reviewers by interviews with the inspectors and observation of the inspections actually performed:

Watts Bar

At WBN the crafts initiated the hanger (support) inspection process. The first step was to request that a "pull test" on the embedded anchors (if applicable) be performed. In order to get this inspection performed, the craftsman completed attachment C of WBN-QCP-4.23 and signed the inspection-request log. After completion of this activity the craftsman requested a final hanger (support) inspection by completing attachment A of WBN-QCP-4.23 and signing the inspection log. (Reviewer's note: WBN-QCP-4.23, "Installation, Inspection, and Documentation Requirements for Seismic Supports," was superseded on July 10, 1982, by WBN-QCP-4.23-2 through -9,procedure series. The above-mentioned attachments were part of WBN-QCP-4.23 and were superseded with the procedure. However, it appeared that the attachments were currently in use at the WBN site.) Prior to performing a final support inspection, the inspector contacted the craft foreman so that craftsmen would be available at the area while the inspector performed the inspection(s). The first inspection observed by NSRS was that of a hanger on which final inspection had been requested.

This particular request was for final support inspection of three hangers (supports) in the reactor building. Two of the three hangers had been inspected previously and had been rejected for wrong location. The supports had been reworked and were resubmitted for inspection on a "pending Field Change Request (FCR)." On these two supports the inspector checked thread engagement of anchors, length of tube steel, proper hanger device, spacing between washers on ends of devices, proper type washers, minimum distance between embedded anchors, size of plate, and weld quality. The weld quality examination consisted of a final visual inspection only, but the inspector did check the welds with a fillet gauge. The inspector noted to the reviewer that the tube steel had been welded on all four sides whereas the drawing (a part of the pending FCR) only required weld on two sides. The inspector stated that this was acceptable in accordance with the 47A050 (typical pipe hanger drawing notes) notes if the added weld was good quality. The only discrepancy

noted by the inspector on these two supports was that the washer spacing (distance between centers of the washers) on one set of washers exceeded the criteria. The inspector informed the craftsman of this discrepancy and the craftsman corrected the problem and the support was accepted in accordance with procedures with no IRN being written. After completion of the inspection of these two supports, the inspector tied each hanger with tape to indicate that they could be painted.

With the exception of checking thread engagement (support was welded to an embedded plate) of anchors, the inspector checked the third support for the same things he had inspected on the first two supports. When checking weld quality the inspector had the craftsman brush the weld to remove some paint. Two discrepancies, undersized weld and arc strike, were noted by the inspector on the third hanger. The inspector informed the craftsman of these problems and left the area. The NSRS reviewer asked the inspector if he was going to write an IRN on this support and the inspector stated that he would not. He did indicate that he would record the reasons for rejecting the support in the "Comments" column on the inspection sign-up log and that the craft would have to sign the log again to have the support reinspected. In accordance with the IRN procedure (WBNP-QCI-1.02-1) the problem should have been documented on an IRN as an unacceptable condition.

On a second inspection, involving hangers on a control air line, the following deficiencies were noted by an instrumentation inspector and were recorded on an IRN:

- Some welds had been painted and could not be inspected.
- One required hanger had not been installed.
- Two hangers on the air line had been welded to reactor building structural steel without an approved (or referenced) variance.

The QC inspector appeared to be familiar with inspection requirements and acceptance criteria. He had with him the required document package and appropriate inspection tools. He displayed diligence in verifying hanger identification and attributes in near-inaccessible areas.

The third observed inspection involved two requested anchor-pull tests and a final acceptance of a hanger on a heating and ventilation system. The two assigned inspectors, both from the Hanger QC Unit, reviewed the document package, verified the status of previous inspections,

consulted Hanger Engineering for referenced information, and verified their test equipment was correctly calibrated. At the anchor-pull inspection location, it was determined that only four of six required bolt holes for each hanger baseplate had been drilled. The inspectors "cancelled" this inspection after consultation with the craft foreman, and an IRN was not written. In accordance with the IRN procedure, an IRN should have been initiated on the unacceptable condition. At the final acceptance hanger location, it was determined that one of the two baseplates of the wall-mounted hanger was oversized and not in conformance with Variance MA-55-81-63. The inspectors indicated this situation would require issuance of an IRN, documenting the condition.

Bellefonte

Hanger inspections were selected for observation at Bellefonte as at Watts Bar. Hanger inspectors normally worked in teams to reduce the chance of interpretation mistakes, for mutual assistance in making and checking measurements, and to simplify data recording. The Hanger QC Unit also required "peer review" of accepted inspections. Peer review was observed to be an internal audit process whereby a second team of experienced inspectors would re-inspect a percentage of recently accepted hangers inspected by other teams in the HQC Unit. In accordance with the site procedure controlling IRNs, hangers found deficient on peer review had to be documented on nonconformance reports. This practice was unique to BLN. NRC, in the 1982 BLN Construction Appraisal Team (CAT) Report, had criticized HQC for both high "peer review" rejection rates and apparent management tolerance of what NRC classified as an excessive rejection rate. NSRS review of current peer review reject rates indicated no substantial decrease through October 1983. However, substitution of the IRN program for the QCIR program may decrease the number of rejections due to interpretation of criteria problems.

NSRS observed both an HQC inspection team and a peer review (or audit) team. The inspection team inspected three hangers, one of which had been previously rejected for excessive gap between the baseplate and the wall to which it was mounted. This hanger was again rejected for the same condition with a new IRN. The unaccepted corrective action had been to attempt to apply grout (cement) around the gap. The other two hangers were accepted after appropriate verification of criteria.

The peer review team was assigned an ITI Grinnell sway strut, previously accepted by HQC for inspection. This support was determined by measurement and calculation to

exceed the allowable 4 degrees tolerance of the snubber angle with the centerline of the pipe by a factor of two.

NCR 2547 was later reported to have been initiated. This was later announced as the first peer review rejection since initiation of the new IRN procedure on November 1, 1983.

The inspectors observed by NSRS reviewers appeared to be familiar with inspection procedures and techniques and operated efficiently in teams. Inspectors were centrally located in the auxiliary building, quickly accessible to the crafts. Necessary reference material was maintained at the central work station.

VII. PERSONNEL CONTACTED

A. Office of Engineering Design and Construction

Brown, Jr.,W. R.; OEDC Project Manager, Bellefonte
Pierce, R. M.; OEDC Project Manager, Watts Bar

B. Office of Quality Assurance

Barnes, J. T.; Supervisor, BLN QA, CQAB
Belzer, J. R.; Superintendent, PSSS, Construction Quality Assurance Branch (COAB)
Copeland, W. M.; Quality Assurance Evaluator, Quality Assurance Unit - Watts Bar
Crittenden, J. A.; Supervisor, Systems Application Section, SPB
Majors, B. L.; Quality Assurance Evaluator, Quality Assurance Unit - Watts Bar
Selewski, J. D.; Quality Assurance Evaluator, Quality Assurance Unit - Watts Bar

C. Division of Construction

Bonine, Jr., C.; Manager, Division of Construction
Wilkins, J. E.; Assistant Manager of Construction
Barrs, D. B.; Section Chief, Quality Engineering and Support Staff (QESS)
Roemer, F. A.; QESS
Larrabee, Jr., E. L.; QESS

1. Bellefonte Nuclear Plant (CONST)

Bass, T. E.; Inspector, Hanger Quality Control Unit
Bell, V. C.; Inspector, Electrical Quality Control Unit
Blackwell, F. C.; Inspector, Welding Quality Control Unit
Brashers, T., Supervisor HEU
Bridges, D. R.; Assistant Quality Manager

Brown, J.; Electrical Quality Control Unit
Brown, W. R.; Inspector, Hanger Quality Control Unit
Chapman, L. D.; Group Leader, DCU-A
Coffman, C. O.; Inspector, Instrumentation Quality Control Unit
Cox, L. S.; Project Manager
Doty, F. L.; Inspector, Mechanical Quality Control Unit
Fischer, B. A., Supervisor, DCU-4
Fischer, M. R.; Inspector, Hanger Quality Control Unit
Foster, J. L.; Inspector, Hanger Quality Control Unit
Franks, C. W.; Inspector, Civil Quality Control Unit
Gardner, E.; Hanger Quality Control Unit
Gross, S. W.; Inspector, Instrumentation Quality Control Unit
Hill, J. D.; Inspector, Mechanical Quality Control Unit
Holder, C. M.; Inspector, Electrical Quality Control Unit
Holloway, J. R.; Hanger Quality Control Unit
Howard, R.; Supervisor, HEU
Hughes, J. H.; Inspector, Welding Quality Control Unit
Johnson, G. M.; Inspector, Welding Quality Control Unit
Johnson, H. C.; Assistant Quality Manager
Johnson, R.; Inspector, Hanger Quality Control Unit
Kindred, J. F.; Inspector, Electrical Quality Control Unit
Lowe, L. E.; Inspector, Electrical Quality Control Unit
Mann, P. C.; Supervisor, Nuclear Licensing Unit
McCollum, R. T.; Supervisor, Mechanical Quality Control Unit
Newton, T. E.; Assistant Quality Manager
Norton, F. M.; Supervisor, Welding Quality Control Unit
Parkey, J. F.; Inspector, Instrumentation Quality Control Unit
Price, S.; Inspector, Instrumentation Quality Control Unit
Richardson, M. R.; Supervisor, Instrumentation Quality Control Unit
Rose, D.; Procedures and Training Unit
Sears, D. E.; Inspector, Civil Quality Control Unit
Spain, J.; Mechanical Quality Control
Storer, J. D., Inspector, Mechanical Quality Control Unit
Thornton, J., Supervisor, Mechanical Engineering Unit
Torrie, T. B.; Inspector, Instrumentation Quality Control Unit
Turner, J. T.; Procedures and Training Unit
Tutor, C. K.; Inspector, Welding Quality Control Unit
White, M. D.; Inspector, Mechanical Quality Control Unit
Whittle, W. T.; Quality Assurance Evaluator, Site Quality Assurance Unit
Williams, T.; Procedures and Training Unit

2. Watts Bar Nuclear Plant

Adams, T. E., Jr.; Inspector, Hanger Quality Control Unit
Aikens, R. A.; HQC, DCU-A

Allender, B. R.; HQC Inspector
Anderson, R. D.; Assistant Quality Manager
Baisden, G. H.; Supervisor, Hanger Quality Control Unit
Ballard, J. P.; Supervisor, Mechanical Engineering Unit-B
Ballew, S. A.; Inspector, Electrical Quality Control Unit
Bessom, W. H.; Supervisor, Civil Quality Control Unit-A
Bridges, D. R.; Inspector, Instrumentation Quality Control Unit
Christopher, C. O.; Assistant Quality Manager
Cofield, J. C.; Assistant Quality Manager
Cole, G. S.; Inspector, Hanger Quality Control Unit
Coleman, A. W.; HQC Inspector
Cornwell, W. G.; Inspector, Welding Quality Control Unit
Deering, W. T.; Inspector, Hanger Quality Control Unit
Demastus, D. H.; Electrical Quality Control Unit
Freeman, C. M.; Supervisor, Civil Quality Control Unit-B
Galloway, K. G.; Supervisor, Welding Quality Control Unit
Gibboney, T. D.; Civil Quality Control Unit-A
Greer, A. S.; Supervisor, Electrical Quality Control Unit
Hadacek, M. W.; Procedures and Training Unit
Hale, H. C.; Inspector, Civil Quality Control Unit-A
Hannah, J. T.; Inspector, Electrical Quality Control Unit
Hardin, R. L.; Inspector, Electrical Quality Control Unit
Hatmaker, W. C.; Procedures and Training Unit
Hitson, C. W.; Inspector, Electrical Quality Control Unit
Huffaker, B. E.; Supervisor, Hanger Engineering Unit-B
Jetton, C., Construction Superintendent
Johnson, L. J.; Assistant Construction Engineer
Johnson, S.; Quality Manager
Lavender, E. J., Inspector, Mechanical Quality Control Unit
Long, C. D.; Inspector, Welding Quality Control Unit
Lowe, C. M.; Supervisor, Instrumentation Quality Control Unit
Luck, J. J.; Inspector, Mechanical Quality Control Unit
Massa, D. G.; Inspector, Hanger Quality Control Unit
McCuiston, F. E., Instrumentation Quality Control
McCurry, M. B.; Inspector, Instrumentation Quality Control Unit
Meadows, W. M., Jr.; Inspector, Hanger Quality Control Unit
Miller, D. W.; Inspector, Welding Quality Control Unit
Mize, J. A. III; Inspector, Mechanical Quality Control Unit
Moore, D. R.; Inspector, Civil Quality Control Unit-A
Nabors, R.; M&A Unit, Assistant Supervisor
Nash, A.; Training Officer (CONST)
Neal, A. B.; Inspector, Hanger Quality Control Unit
Nichols, G. W.; Inspector, Mechanical Quality Control Unit
Oggs, M. L.; Inspector, Civil Quality Control Unit-A
Oglesby, T.; Inspector, Instrumentation Quality Control Unit

Richardson, G. L.; Inspector, Electrical Quality Control Unit
Rogers, S. R.; IQC Inspector
Self, J. W.; Supervisor, N-5 Unit
Shepard, P. L.; Supervisor, Electrical Engineering Unit-C
Somerfield, D. E.; Inspector, Instrumentation Quality Control Unit
Terry, M. R.; Inspector, Mechanical Quality Control Unit
Thomas, V. P.; Supervisor, Instrumentation Engineering Unit-A
Vest, G. E.; Mechanical Quality Control Unit
Vowell, J. C.; Inspector, Mechanical Quality Control Unit
Wadewitz, G.; Project Manager
Weinbaum, J.; Supervisor, Materials Service Unit
Woody, C. M.; Inspector, Hanger Quality Control Unit

VIII. DOCUMENTS REVIEWED

WBNP-QCI 1.37, R7, "Quality Assurance Organization - Watts Bar Nuclear Plant"

WBNP-QCI 1.11-1, "Indoctrination and Training Program"

WBNP-QCI 1.11-2, "Qualification/Certification of Construction QC Inspector"

WBNP-QCI 1.11-3, "Qualification Program for Engineering Functions"

WBNP-QCI 1.11-4, "Craft Qualification/Certification Program"

QAPP 6, Revision 3, "Document Control"

QAPP 10, Revision 2, "Inspection"

QAPP 17, Revision 2, "QA Records"

Quality Engineering Staff Manual

CONST Quality Assurance Indoctrination Training and Qualification Program Manual

BNP-QCP-10.29, R5, "Quality Assurance Training Program - Bellefonte Nuclear Plant"

BNP-QCP-10.30, R4, "Craft Quality Assurance Training - Bellefonte Nuclear Plant"

BNP-QCP-3.7, R6, "Electrical Hangers"

BNP-QCP-3.9, R5, "Electrical and Instrumentation Panels, Boards, and Equipment"

WBNP-QCP-1.14, R13, "Inspection and Testing of Bolt Anchors Set in Hardended Concrete and Control of Attachments to Embedded Features," (Addendums 1 and 2), April 4, 1983

WBNP-QCP-4.13-VTC, R0, "Final Visual Weld Examination," (Addendum 1) May 16, 1983

WBNP-QCP-4.23-3, R1, "Support Location and Orientation," August 18, 1983

WBNP-QCP-4.23-4, R1, "Support Visual Examination of Weld Joints," May 16, 1983

WBNP-QCP-4.23-5, R3, "Support Shock Suppressors," August 18, 1983

WBNP-QCP-4.23-6, R2, "Support Springs," August 18, 1983

WBNP-QCP-4.23-7, R1, "Support Lubrication," August 18, 1983

WBNP-QCP-4.23-8, R3, "Support Final Inspection," August 18, 1983

WBNP-QCI-1.02-1, R5, "Inspection Rejection Notices," April 20, 1983

Memorandum from A. W. Rogers to P. E. Orstadt dated September 22, 1983, "Engineering/Quality Control and Quality Manager Organization"

BNP-QCP-6.17, R0, "Seismic Support Installation and Inspection," October 17, 1983

BNP-QCP-10.43, R0, "Inspection Rejection Notice," (Addendum 1), November 1, 1983

Memorandum from H. N. Culver to W. F. Willis dated July 19, 1983, "Response to Board Comment " (GNS 830719 053)

Memorandum from H. N. Culver to W. F. Willis dated August 9, 1983, "Response to Board Comment," (GNS 830809 053)

Memorandum from J. T. Barnes to P. E. Orstadt dated September 27, 1983, "Benefits of Engineering-Quality Control Split"

Memorandum from R. M. Hodges to L. S. Cox dated November 25, 1983, "BLN Nonconformance Report No. 1885"

ATTACHMENT 1

Attachment to Memorandum from
N. N. Hull to Those Listed
dated 11-19-82

CONST QUALITY ENGINEERING AND SUPPORT STAFF

592-33-XXXX

Chief
D. W. Mack
-0500

Special Assignment
E. J. Gardner
R. D. Snyder

Clerical
B. P Stafford
M. L. Williams

Supervisor, Quality Engineering Unit
D. B. Barrs
-0510

Supervisor, Technical Engineering Support Unit
W. H. Nichols
-0520

Asst. Unit Supervisor
J. T. McGehee

Quality Requirements Group -0511
J. A. Roemer
P. L. Bigarel
T A Hare
J E Clark

Quality Implementing Group -0512
J. C. Bright
D. E. Brogan
R. G. Sharrod

Quality Improvement Group -0521
S. A. Blount
D. G. Gillim
E. L. Larrabee

Technical Engineering Support Group -0522
D. L. Schneider
W. R. Jones

Training 0501
Files/Copy Room 0502

ATTACHMENT 2

IRN TREND REPORTS

MARCH-SEPTEMBER 1533 - WATTS BAR

	March	April	May	June	July	August	Sept	Totals
Weld	3/6388	4/8407	8/6078	12/8260	1/9505	9/8305	0/7473	37/54377
HGR	29/2650	17/1997	7/1849	8/1555	6/2904	20/4454	2/3806	89/19215
Civil A	4/8963	2/9609	6/8493	0/7038	1/18,113	2/10,698	4/8180	19/71,084
Civil B	5/4234	0/4824	1/5746	0/7476	0/9698	0/9947	1/9992	7/51,917
							TOTAL	152/196,593
Mech	50/1342	20/767	5/319	43/1278	98/645	63/626	79/744	358/5751
Elec	30/1009	133/2108	108/1611	90/1486	134/1330	208/1373	248/2357	951/11,274
Inst	58/1333	99/1722	85/2017	27/1004	46/835	54/677	91/901	470/8504
Matl Svc	15/348	15/442	9/344	11/312	5/328	13/393	22/584	90/2831
							TOTAL	1869/28,360

(IRNs Written/Inspections Performed)

ATTACHMENT 3

TREND ANALYSIS REPORTS

SEMI-ANNUAL - NCRs - WATTS BAR

	Jan-June 1980	July-Dec 1980	Jan-June 1981	July-Dec 1981	Jan-June 1982	July-Dec 1982	Jan-June 1983
Mech	100	152	221	248	121	110	99
Weld	76	116	33	23	17	14	60
Hgr				44	51	49	55
Elec	24	36	44	40	22	36	25
Civil	15	17	32	75	35	32	47
Inst	11	8	17	36	32	2	14
R&S	39	27	25	NR	NR		9
Doc	156	106	153	NR	NR	0	3
Totals	421	462	515	466	278	264	312

NR - Not Reported

ATTACHMENT 4

WATTS BAR TREND ANALYSIS

SIGNIFICANT AND REPORTABLE ITEMS

	1980, Quarters				1980	1981, Quarters				1981	1982, Quarters				1982	1983, Quarters		
	1	2	3	4	Total	1	2	3	4	Total	1	2	3	4	Total	1	2	3
I NCR	21	6	8	17	52	12	6	8	14	45	11	15	8	15	49	11	4	5
II 5055E	17	3	5	7	32	8	12	10	3	33	5	6	5	31	47	3	0	2
III NCR	2	3	16	7	22	8	0	0	0	8	0	4	0	0	4	0	0	0
IV Audit	1	1	0	3	5	9	1	1	5	16	1	6	5	2	14	0	0	0
V Pt 21	0	0	0	0	0	0	0	0	1	1	0	1	0	0	1	0	0	0

AUDIT ITEMS

I CQA	20	32	26	28	106	36	15	23	32	106	27	40	58	54	179	18	12	8
II ANI	5	2	0	8	15	5	0	0	2	7	6	3	1	1	11	2	0	1
III ASME	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IV OEDC	3	0	0	0	3	0	5	0	0	5	0	0	1	0	1	(OEDC QA Extinct OQA Auditing)		

BELLEFONTE TREND ANALYSIS

SIGNIFICANT AND REPORTABLE ITEMS

I 5055E	9	13	16	22	60	6	6	12	12	36	11	10	6
II Pt 21	4	10	7	21	42	5	5	4	4	18	6	1	1
III NCRs	16	23	19	25	83	10	8	17	23	58	11	10	0
IV NRC	4	4	5	6	19	5	7	7	5	24	17	6	10
V Audit	0	0	0	1	1	0	0	2	0	2	1	0	-

AUDIT ITEMS

Deficiencies	33	32	29	35	129	30	25	33	28	116	0	0	11
													(OQA Auditing)